

Mr. John Little
Indiana State University
951 Sycamore Street
Terre Haute, Indiana 47809

Re: 167-10718
Significant Source Modification to:
Part 70 permit No.: T167-7546-00010

Dear Mr. Little:

Indiana State University was issued Part 70 operating permit T167-7546-00010 on December 31, 1998 for operation of boilers and incinerators at a university. An application to modify the source was received on February 26, 1999. Pursuant to 326 IAC 2-7-10.5 the following emission units are approved for construction at the source:

1. One (1) natural gas or #2 fuel oil fired boiler, identified as Boiler N1, with a maximum heat input capacity of 88.24 MMBtu per hour, using low NO_x burners as control, and exhausting to stack 1.
2. One (1) natural gas or #2 fuel oil fired boiler, identified as Boiler N2, with a maximum heat input capacity of 88.24 MMBtu per hour, using low NO_x burners as control, and exhausting to stack 2.
3. One (1) natural gas or #2 fuel oil fired boiler, identified as Boiler N3, with a maximum heat input capacity of 88.24 MMBtu per hour, using low NO_x burners as control, and exhausting to stack 3.
4. One (1) #2 fuel oil fired emergency generator, identified as Emergency Generator 1, with a maximum capacity of 1408 HP, and exhausting to stack 4.
5. Three (3) #2 fuel oil storage tanks, identified as tank 1, tank 2 and tank 3, with a maximum capacity of 50,000 gallons (189.25 cubic meters) each.

The following construction conditions are applicable to the proposed project:

General Construction Conditions

1. The data and information supplied with the application shall be considered part of this source modification approval. Prior to any proposed change in construction which may affect the potential to emit (PTE) of the proposed project, the change must be approved by Vigo County Air Pollution Control (VCAPC) and the Office of Air Management (OAM).

2. This approval to construct does not relieve the permittee of the responsibility to comply with the provisions of the Indiana Environmental Management Law (IC 13-11 through 13-20; 13-22 through 13-25; and 13-30), the Air Pollution Control Law (IC 13-17) and the rules promulgated thereunder, as well as other applicable local, state, and federal requirements.
3. Effective Date of the Permit
Pursuant to IC 13-15-5-3, this approval becomes effective upon its issuance.
4. Pursuant to 326 IAC 2-1.1-9 and 326 IAC 2-7-10.5(i), the Commissioner may revoke this approval if construction is not commenced within eighteen (18) months after receipt of this approval or if construction is suspended for a continuous period of one (1) year or more.
5. All requirements and conditions of this construction approval shall remain in effect unless modified in a manner consistent with procedures established pursuant to 326 IAC 2.
6. Pursuant to 326 IAC 2-7-10.5(l) the emission units constructed under this approval shall not be placed into operation prior to revision of the source's Part 70 Operating Permit to incorporate the required operation conditions.

The proposed operating conditions applicable to these emission units are attached to this Source Modification approval. These proposed operating conditions shall be incorporated into the Part 70 operating permit as an administrative amendment in accordance with 326 IAC 2-7-10.5(l)(1) and 326 IAC 2-7-11.

This decision is subject to the Indiana Administrative Orders and Procedures Act - IC 4-21.5-3-5. If you have any questions on this matter call 812-462-3433 and ask for Rob Harmon.

Sincerely,

George M. Needham
Director
Vigo County Air Pollution Control

Attachments
RKH

cc: U.S. EPA, Region V
IDEM, OAM - Winter Bottum
IDEM, OAM - Mindy Hahn
Illinois Environmental Protection Agency

**Indiana Department of Environmental Management
Office of Air Management
and
Vigo County Air Pollution Control**

Technical Support Document (TSD) for a for a
Significant Source Modification to a Part 70 Operating Permit

Source Background and Description

Source Name:	Indiana State University
Source Location:	951 Sycamore Street, Terre Haute, Indiana 47809
County:	Vigo County
SIC Code:	8221
Operation Permit No.:	T167-7546-00010
Operation Permit Issuance Date:	December 31, 1998
Source Modification No.:	T167-10718-00010
Permit Reviewer:	Rob Harmon

Vigo County Air Pollution Control (VCAPC) and the Office of Air Management (OAM) have reviewed a modification application from Indiana State University relating to the operation of a new powerhouse consisting of the following equipment:

- (A) One (1) natural gas or #2 fuel oil fired boiler, identified as Boiler N1, with a maximum heat input capacity of 88.24 MMBtu per hour, using low NO_x burners as control, and exhausting to stack 1.
- (B) One (1) natural gas or #2 fuel oil fired boiler, identified as Boiler N2, with a maximum heat input capacity of 88.24 MMBtu per hour, using low NO_x burners as control, and exhausting to stack 2.
- (C) One (1) natural gas or #2 fuel oil fired boiler, identified as Boiler N3, with a maximum heat input capacity of 88.24 MMBtu per hour, using low NO_x burners as control, and exhausting to stack 3.
- (D) One (1) #2 fuel oil fired emergency generator, identified as Emergency Generator 1, with a maximum capacity of 1341 HP, and exhausting to stack 4.
- (E) Three (3) #2 fuel oil storage tanks, identified as tank 1, tank 2 and tank 3, with a maximum capacity of 50,000 gallons (189.25 cubic meters) each.

History

On February 26, 1999, Indiana State University submitted an application to VCAPC and the OAM requesting to add three new boilers and an emergency generator (including fuel oil storage) to replace the existing power plant. Indiana State University was issued a Part 70 permit on December 31, 1998. The new powerhouse will have a total heat input capacity of 264.72 million BTU per hour with only natural gas and #2 fuel oil for fuel. The plant being replaced has a total heat input capacity of 381.25 million BTU per hour and was fired primarily on coal in the fall, winter, and spring and natural gas (with fuel oil backup) in the summer. The reduction in capacity and the switch to cleaner fuels results in a much cleaner operation.

Existing Approvals

The source was issued a Part 70 Operating Permit T167-7546-00010 on December 31, 1998.

After the replacement the entire operation will remain a Part 70 source.

Enforcement Issue

There are no enforcement actions pending.

Stack Summary

Stack ID	Operation	Height (feet)	Diameter (feet)	Flow Rate (acfm)	Temperature (°F)
1	Boiler N1	88.0	3.17	24,962	330
2	Boiler N2	88.0	3.17	24,962	330
3	Boiler N3	88.0	3.17	24,962	330
4	Emg Generator	59.3	1.0	8651	891

Recommendation

The staff recommends to the Commissioner that the Significant Source Modification be approved. This recommendation is based on the following facts and conditions:

Unless otherwise stated, information used in this review was derived from the application and additional information submitted by the applicant.

An application for the purposes of this review was received on February 26, 1999.

Emission Calculations

See Appendix A of this document for detailed emissions calculations (pages 1 through 16).

Potential To Emit

Pursuant to 326 IAC 2-1.1-1(16), Potential to Emit is defined as “the maximum capacity of a stationary source to emit any air pollutant under its physical and operational design. Any physical or operational limitation on the capacity of a source to emit an air pollutant, including air pollution control equipment and restrictions on hours of operation or type or amount of material combusted, stored, or processed shall be treated as part of its design if the limitation is enforceable by the U. S. EPA.”

The Potential to Emit, before fuel use limitations, of the new project only is as follows:

Pollutant	Potential To Emit (tons/year)
PM	27.57
PM-10	27.57
SO ₂	589.37
VOC	6.61
CO	99.24
NO _x	206.81

Note: For the purpose of determining Title V applicability for particulates, PM-10, not PM, is the regulated pollutant in consideration.

HAP's	Potential To Emit (tons/year)
TOTAL	less than 10

- (a) The potential to emit (as defined in 326 IAC 2-1.1-1(16)) of PM₁₀, SO₂, CO and NO_x are equal to or greater than 25 tons per year. Therefore, the source is subject to the modification provisions of 326 IAC 2-7.

Actual Emissions

The following table shows the actual emissions from the source. This information reflects the 1997 VCAPC and OAM emission data.

Pollutant	Actual Emissions (tons/year)
PM	2.5302
PM-10	0.9806
SO ₂	912.5363
VOC	0.8496
CO	65.6035
NO _x	84.7105

Limited Potential to Emit

	Pollutant (tons per year)					
	PM	PM10	SO2	NOx	VOC	CO
Potential Emissions from the Project (after limit)	15.81	11.02	34.02	114.98	0.96	23.95
Subtract Creditable Reductions	1.83	0.84	733.59	75.98	0.65	60.72
Total Net Emissions	13.98	10.17	-699.57	39.00	0.31	-36.76
PSD Significant Levels	25.00	15.00	40.00	40.00	40.00	100.00

Therefore, the limitation works to keep the Project below the PSD significant level for all pollutants.

County Attainment Status

The source is located in Vigo County.

Pollutant	Status
PM-10	attainment
SO ₂	maintenance attainment
NO ₂	attainment
Ozone	attainment
CO	attainment
Lead	attainment

- (a) Volatile organic compounds (VOC) and oxides of nitrogen (NO_x) are precursors for the formation of ozone. Therefore, VOC and NO_x emissions are considered when evaluating the rule applicability relating to the ozone standards. Vigo County has been designated as attainment or unclassifiable for ozone.

Prevention of Significant Deterioration Determination

This modification is not considered a significant modification with regard to the Prevention of Significant Deterioration rules (326 IAC 2-2) because the limited net PTE is below the significant thresholds. A detailed calculation demonstrating this appears on page 16 of 16 of TSD Appendix A.

Federal Rule Applicability

- (a) The three (3) 88.24 MMBTU/hour boilers (identified as Boiler N1, Boiler N2, and Boiler N3) are subject to the New Source Performance Standard, 326 IAC 12, (40 CFR 60.40c), Subpart Dc. (Because they are between 10 MMBTU/hr and 100 MMBTU/hr and will be constructed after June 9, 1989) The requirements are as follows:

Pursuant to 40 CFR 60.42c(d) "... no owner or operator of an affected facility that combusts oil shall cause to be discharged into the atmosphere from that affected facility any gases that contain SO₂ in excess of 215 ng/J (0.50 lb/million BTU) heat input; or as an alternative, no owner or operator of an affected facility that combusts oil shall combust oil in the affected facility that contains greater than 0.5 weight percent sulfur..."

Pursuant to 40 CFR 60.42c(h) "...compliance with the emission limits or fuel oil sulfur limits under this section may be determined based on a certification from the fuel supplier, as described under § 60.48c(f)(1), (2), or (3), as applicable."

Pursuant to 40 CFR 60.42c(i) "The SO₂ emission limits, fuel oil sulfur limits, and the percent reduction requirements under this section apply at all times, including periods of startup, shutdown, and malfunction."

Pursuant to 40 CFR 60.43c(c) "On and after the date on which the initial performance test is completed or required to be completed under § 60.8 of this part, whichever date comes first, no owner or operator of an affected facility that combusts coal, wood, or oil and has a heat input capacity of 8.7 MW (30 million BTU/hr) or greater shall cause to be discharged into the atmosphere from that affected facility any gases that exhibit greater than 20 percent opacity (6-minute average), except for one 6-minute period per hour of not more than 27 percent opacity."

Pursuant to 40 CFR 60.43c(d) "The PM and opacity standards under this section apply at all times, except during periods of startup, shutdown, or malfunction."

Pursuant to 40 CFR 60.44c(h) "For affected facilities subject to § 60.42c(h)(1), (2), or (3) where the owner or operator seeks to demonstrate compliance with the SO₂ standards based on fuel supplier certification, the performance test shall consist of the certification, the certification from the fuel supplier, as described under § 60.48c(f)(1), (2), or (3), as applicable."

Pursuant to 40 CFR 60.45c(a) "The owner or operator of an affected facility subject to the PM and/or opacity standards under § 60.43c shall conduct an initial performance test as required under § 60.8, and shall conduct subsequent performance tests as requested by the Administrator, to determine compliance with the standards using the following procedures and reference methods."

Pursuant to 40 CFR 60.45c(a)(7) "Method 9 (6-minute average of 24 observations) shall be used for determining the opacity of stack emissions."

Pursuant to 40 CFR 60.48c(a) "The owner or operator of each affected facility shall submit notification of the date of construction or reconstruction, anticipated startup, and actual startup, as provided by § 60.7 of this part. This notification shall include:

Pursuant to 40 CFR 60.48c(a)(1) "The design heat input capacity of the affected facility and identification of fuels to be combusted in the affected facility."

Pursuant to 40 CFR 60.48c(a)(2) "If applicable, a copy of any Federally enforceable requirement that limits the annual capacity factor for any fuel or mixture of fuels under § 60.42c, or § 60.43c.

Pursuant to 40 CFR 60.48c(a)(3) "The annual capacity factor at which the owner or operator anticipates operating the affected facility based on all fuels fired and based on each individual fuel fired."

Pursuant to 40 CFR 60.48c(a)(4) "Notification if an emerging technology will be used for controlling SO₂ emissions. The administrator will examine the description of the control device and will determine whether the technology qualifies as an emerging technology. In making this determination, the Administrator may require the owner or operator of the affected facility to submit additional information concerning the control device. The affected facility is subject to the provisions of § 60.42c(a) or (b)(1), unless and until this determination is made by the Administrator.

Pursuant to 40 CFR 60.48c(b) "The owner or operator of each affected facility subject to the SO₂ emission limits of § 60.42c or the PM or opacity limits of § 60.43c, shall submit to the Administrator the performance tests and, if applicable, the performance evaluation of the CEMS using the applicable performance specifications in Appendix B."

Pursuant to 40 CFR 60.48c(d) "The owner or operator of each affected facility subject to the SO₂ emission limits, fuel oil sulfur limits, or percent reduction requirements under § 60.42c shall submit quarterly reports to the Administrator. The initial quarterly report shall be postmarked by the 30th day of the third month following the completion of the initial performance test. Each subsequent quarterly report shall be postmarked by the 30th day following the end of the reporting period.

Pursuant to 40 CFR 60.48c(e) " The owner or operator of each affected facility subject to the SO₂ emission limits, fuel oil sulfur limits, or percent reduction requirements under § 60.43c shall keep records and submit quarterly reports as required under paragraph (d) of this section, including the following information, as applicable." (Only those requirements affecting this project have been listed)

Pursuant to 40 CFR 60.48c(e)(1) "Calendar dates covered in the reporting period."

Pursuant to 40 CFR 60.48c(e)(2) "Each 30-day average SO₂ emission rate (ng/J or lb/million BTU), or 30-day average sulfur content (weight percent), calculated during the reporting period, ending with the last 30-day period in the quarter; reasons for any noncompliance with the emission standards; and a description of corrective actions taken."

Pursuant to 40 CFR 60.48c(e)(11) "If fuel supplier certification is used to demonstrate compliance, records of fuel supplier certification as described under paragraph (f)(1), (2), or (3) of this section, as applicable. In addition to records of fuel supplier certifications, the quarterly report shall include a certified statement signed by the owner or operator of the affected facility that the records of fuel supplier certifications submitted represent all of the fuel combusted during the quarter."

Pursuant to 40 CFR 60.48c(f) "Fuel supplier certification shall include the following information: (1) For distillate oil: (i) The name of the oil supplier; and (ii) A statement from the oil supplier that the oil complies with the specifications under the definition of distillate oil in § 60.41c."

Pursuant to 40 CFR 60.48c(g) "The owner or operator of each affected facility shall record and maintain records of the amounts of each fuel combusted during each day."

Pursuant to 40 CFR 60.48c(i) "All records required under this section shall be maintained by the owner or operator of the affected facility for a period of two years following the date of such record."

- (b) The three (3) 50,000 gallon fuel oil storage tanks (identified as tank 1, tank 2, and tank 3) are subject to the New Source Performance Standard, 326 IAC 12, (40 CFR 60.110b, Subpart Kb). (Because they are larger than 40 cubic meters, containing a volatile organic liquid, and will be constructed after July 23, 1984) The requirements are as follows:

Pursuant to 40 CFR 60.110b(c) "Except as specified in paragraphs (a) and (b) of § 60.116b, storage vessels either with a capacity greater than 151 m³ storing a liquid with a maximum true vapor pressure less than 3.5 kPa ...are exempt from the General Provisions (part 60, subpart A) and from the provisions of this subpart." (These tanks are 189.25 cubic meters each with a vapor pressure of 0.0427 kPa)

Pursuant to 40 CFR 60.116b(a) "The owner or operator shall keep copies of all records required by this section, except for the record required by paragraph (b) of this section, for at least 2 years. The record required by paragraph (b) of this section will be kept for the life of the source."

Pursuant to 40 CFR 60.116b(b) "The owner or operator of each storage vessel as specified in § 60.110b(a) shall keep readily accessible records showing the dimension of the storage vessel and an analysis showing the capacity of the storage vessel..."

- (c) There are no National Emission Standards for Hazardous Air Pollutants (NESHAPs)(326 IAC 14 and 40 CFR art 63) applicable to this source.

Existing Requirements

Once the new powerhouse is complete and in full time operation, the existing boilers #2, #3, #4, and #5 will be permanently removed from service. Once this occurs, the conditions under Section D.1 of the existing Part 70 permit will no longer be in effect because none of the listed equipment will be in operation.

State Rule Applicability - Entire Source

326 IAC 2-6 (Emission Reporting)

This source is subject to 326 IAC 2-6 (Emission Reporting), because it has the potential to emit more than one hundred tons per year of several criteria pollutants. Pursuant to this rule, the owner/operator of the source must annually submit an emission statement for the source. The annual statement must be received by July 1 of each year and contain the minimum requirement as specified in 326 IAC 2-6-4. The submittal should cover the period defined in 326 IAC 2-6-2(8)(Emission Statement Operating Year).

326 IAC 5-1 (Visible Emissions Limitations)

Pursuant to 326 IAC 5-1-2 (Opacity Limitations), except as provided in 326 IAC 5-1-3 (Temporary Exemptions), opacity shall meet the following, unless otherwise stated in this permit:

- (a) Opacity shall not exceed an average of thirty percent (30%) any one (1) six (6) minute averaging period as determined in 326 IAC 5-1-4.
- (b) Opacity shall not exceed sixty percent (60%) for more than a cumulative total of fifteen (15) minutes (sixty (60) readings) as measured according to 40 CFR 60, Appendix A, Method 9 or fifteen (15) one (1) minute nonoverlapping integrated averages for a continuous opacity monitor) in a six (6) hour period.

State Rule Applicability - Individual Facilities

326 IAC 2-2 (Prevention of Significant Deterioration)

In order to avoid the requirements of 326 IAC 2-2 the new boiler house operations (three boilers and an emergency generator) had to take a limit on the amount of fuel combusted. Specifically, without the limitation the source would be above the significant threshold for NO_x, PM and PM10. Since natural gas will be the main fuel, and the boilers will consume the most fuel, this combination was set to be the base unit for the equivalent limitation. The limit was determined (see Appendix A, page 13 of 16 for detailed explanation) to be 4599 million equivalent cubic feet per twelve month period, rolled monthly. Based on the relative heat input values and the relative emission factors 0.480 million cubic feet of natural gas per thousand gallons fuel oil in the boiler was determined to be one conversion factor and 0.000457 million cubic feet of natural gas per thousand gallons fuel oil in the generator was determined to be the other. Using these the source can report the actual use of each of the 3 options along with the "equivalent" natural gas use to compare to the limitation.

326 IAC 6-2-4 (Emission Limitations for sources of indirect heating)

Pursuant to 326 IAC 6-2-4 the PM emissions are limited by the following equation:

$$Pt = \frac{1.09}{Q^{0.26}}$$

With Pt = Pounds of particulate matter emitted per million BTU (lb/MMBTU) heat input.
Q = Total source maximum operating capacity rating in million BTU per hour (MMBTU/hour) heat input. The maximum operating capacity rating is defined as the maximum capacity at which the facility is operated or the nameplate capacity, whichever is specified in the facility's permit application, except when some lower capacity is contained in the facility's operation permit; in which case, the capacity specified in the operation permit shall be used.

Since the new boilers have a total heat input capacity of 264.72 million BTU per hour, and the existing boilers will be removed so their capacities do not need to be included, the total Q for this calculation is 264.72 million BTU per hour. Therefore the particulate emission limit is 0.256 pounds per million BTU.

The worst case particulate emissions, from the boilers, come from combustion of #2 fuel oil. This oil has an emission factor of 3.3 pounds of particulate matter for every 1000 gallons burned. Assuming a heat content of 140,000 BTU per gallon results in an anticipated emission rate of 0.024 pounds of particulate matter per million BTU. This anticipated emission rate is substantially below the allowable emission rate.

326 IAC 7-1.1-2 (Sulfur Dioxide Emission limitations)

Pursuant to 326 IAC 7-1.1-2 the fuel oil utilized by the boilers and the emergency generator can not exceed 0.5 pound per million BTU for distillate oil combustion. The source specifically requested a limitation of 0.05% sulfur in the fuel oil utilized, so they easily meet this requirement as well as the NSPS requirement above.

Compliance Requirements

Permits issued under 326 IAC 2-7 are required to ensure that sources can demonstrate compliance with applicable state and federal rules on a more or less continuous basis. All state and federal rules contain compliance provisions, however, these provisions do not always fulfill the requirement for a more or less continuous demonstration. When this occurs VCAPC and IDEM, OAM, in conjunction with the source, must develop specific conditions to satisfy 326 IAC 2-7-5. As a result, compliance requirements are divided into two sections: Compliance Determination Requirements and Compliance Monitoring Requirements.

Compliance Determination Requirements in Section D of the permit are those conditions that are found more or less directly within state and federal rules and the violation of which serves as grounds for enforcement action. If these conditions are not sufficient to demonstrate continuous compliance, they will be supplemented with Compliance Monitoring Requirements, also Section D of the permit. Unlike Compliance Determination Requirements, failure to meet Compliance Monitoring conditions would serve as a trigger for corrective actions and not grounds for enforcement action. However, a violation in relation to a compliance monitoring condition will arise through a source's failure to take the appropriate corrective actions within a specific time period.

The compliance monitoring requirements applicable to this source are as follows:

1. The three (3) boilers (Boiler N1, Boiler N2, and Boiler N3) have applicable compliance monitoring conditions as specified below:

- (a) Daily visible emissions notations of the boiler's stack exhaust shall be performed during normal daylight operations, whenever oil is being combusted. A trained employee will record whether emissions are normal or abnormal. For processes operated continuously "normal" means those conditions prevailing, or expected to prevail, eighty percent (80%) of the time the process is in operation, not counting startup or shut down time. In the case of batch or discontinuous operations, readings shall be taken during that part of the operation that would normally be expected to cause the greatest emissions. A trained employee is an employee who has worked at the plant at least one (1) month and has been trained in the appearance and characteristics of normal visible emissions for that specific process. The Preventive Maintenance Plan for this unit shall contain troubleshooting contingency and corrective actions for when an abnormal emission is observed.
- (b) No specific stack testing is required, beyond the NSPS specified initial opacity testing, because the calculated emissions are much below the limitations and problems are not anticipated. Even though not expected, language was added to the permit to remind the source that in the event of future problems they could be ordered to conduct the testing.

These monitoring conditions are necessary in order to ensure compliance with the opacity provisions under 326 IAC 5-1 and 40 CFR 60.43c(c).

Air Toxic Emissions

Indiana presently requests applicants to provide information on emissions of the 188 hazardous air pollutants (HAPs) set out in the Clean Air Act Amendments of 1990. These pollutants are either carcinogenic or otherwise considered toxic and are commonly used by industries. They are listed as air toxics on the Office of Air Management (OAM) Part 70 Application Form GSD-08.

- (a) This source will emit levels of air toxics less than those which constitute a major source according to Section 112 of the 1990 Clean Air Act Amendments.
- (b) See attached calculations (page 2 and 4 of TSD Appendix A) for detailed air toxic calculations.

Conclusion

The construction of this new powerhouse shall be subject to the conditions of the attached proposed **Source Modification No. T167-10718-00010**.

SECTION D.4

FACILITY OPERATION CONDITIONS

Facility Description [326 IAC 2-7-5(15)]

1. One (1) natural gas or #2 fuel oil fired boiler, identified as Boiler N1, with a maximum heat input capacity of 88.24 MMBtu per hour, using low NO_x burners as control, and exhausting to stack 1.
2. One (1) natural gas or #2 fuel oil fired boiler, identified as Boiler N2, with a maximum heat input capacity of 88.24 MMBtu per hour, using low NO_x burners as control, and exhausting to stack 2.
3. One (1) natural gas or #2 fuel oil fired boiler, identified as Boiler N3, with a maximum heat input capacity of 88.24 MMBtu per hour, using low NO_x burners as control, and exhausting to stack 3.
4. One (1) #2 fuel oil fired emergency generator, identified as Emergency Generator 1, with a maximum capacity of 1408 HP, and exhausting to stack 4.
5. Three (3) #2 fuel oil storage tanks, identified as tank 1, tank 2 and tank 3, with a maximum capacity of 50,000 gallons (189.25 cubic meters) each.

Net Emission Reduction

D.4.1 Removal of Emission Sources

As part of this construction project, the Permittee shall remove Boiler #2, Boiler #3, Boiler #4 and Boiler #5 from operation prior to full time operation of the three (3) new boilers. The full time operation does not include a shakedown period for the new units during which time the four (4) old boilers may be used on standby basis to prevent interruption of steam production. This shakedown period shall not exceed six (6) months.

Emission Limitations and Standards [326 IAC 2-7-5(1)]

D.4.2 Fuel Use Limit - Prevention of Significant Deterioration Avoidance [326 IAC 2-2]

Pursuant to 326 IAC 2-2, the three boilers (Boiler N1, Boiler N2, and Boiler N3) as well as the Emergency Generator (Emergency Generator 1) shall not use more than 4599 million “equivalent” cubic feet of natural gas per twelve month period, rolled monthly such that **net** NO_x potential emissions are equivalent to 39 tons per year. This occurs when the boilers fuel is limited to an amount equivalent to NO_x emissions of 114.98 tons per year. For the purpose of determining “equivalent” million cubic feet the following conversions shall be used:

For natural gas burned in the boilers, 1 million “equivalent” cubic feet = 1 million “cubic feet (base unit) natural gas.

For fuel oil burned in the boilers, 0.480 million “equivalent” cubic feet = one thousand gallons fuel oil.

**Indiana Department of Environmental Management
Office of Air Management
and
Vigo County Air Pollution Control**

Addendum to the
Technical Support Document for a Significant Source Modification at a Source
with a Part 70 Operating Permit

Source Name:	Indiana State University
Source Location:	951 Sycamore Street, Terre Haute, Indiana 47809
County:	Vigo County
SIC Code:	8221
Operation Permit No.:	T167-7546-00010
OP Issuance Date:	December 31, 1998
Source Modification No.:	T167-10718-00010
Permit Reviewer:	Rob Harmon

On May 20, 1999, Vigo County Air Pollution Control (VCAPC) and the Office of Air Management (OAM) had a notice published in the Terre Haute Tribune Star, Terre Haute, Indiana, stating that Indiana State University had applied for a Significant Source Modification to construct a new powerhouse. The notice also stated that VCAPC and OAM proposed to issue a permit for this equipment and provided information on how the public could review the proposed permit and other documentation. Finally, the notice informed interested parties that there was a period of thirty (30) days to provide comments on whether or not this permit should be issued as proposed.

On June, 17, 1999, Stanley Consultants, Inc. submitted comments, on behalf of Indiana State University, on the proposed Significant Source Modification. The summary of the comments is as follows (~~strikeout~~ indicates language removed, **redline** indicates language added):

Comment #1

The emergency generator engine as noted in the permit application on Form J-1 should be listed with an output of 1408 HP. The generator itself is rated at 1000 kW, however, considering a generator efficiency of 95%, the HP of the engine would not be 1341 HP but 1408 HP.

Response #1

The description was placed in the related documents according to the application. The above requested changes were made on: the cover letter, the calculations related to the emergency generator, and page 46a of the permit. The description in the TSD should read as follows:

- D. One (1) #2 fuel oil fired emergency generator, identified as Emergency Generator 1, with a maximum capacity of ~~1341~~**1408** HP, and exhausting to stack 4.

Additionally, as a result of this change the source wide Potential to Emit for the new project is changed as follows:

Pollutant	Potential To Emit (tons/year)
PM	27.57 27.58
PM-10	27.57 19.29
SO ₂	589.37 589.44
VOC	6.61 6.63
CO	99.24 99.33
NO _x	206.81 207.21

Note: For the purpose of determining Title V applicability for particulates, PM-10, not PM, is the regulated pollutant in consideration.

HAP's	Potential To Emit (tons/year)
TOTAL	less than 10

Comment #2

On Page 14 of 16 TSD Appendix A, we believe that the gallons of fuel oil in the boilers to meet the emission limit per year should be 9581.72, 1000 gallons.

Response #2

The change was made. The term “thousands” should have already been in, but it was inadvertently omitted.

Comment #3

On page 14 of 16 TSD Appendix A, we believe that under the equivalent fuel oil use for the emergency generator that 448 pounds of NO_x will be emitted per 1000 gallons as opposed to 0.0229. This results in an equivalent million cubic feet of natural gas per thousand gallons of oil of 8.96 and fuel oil in the generator to meet the emission limit per year of 513.3 - 1,000 gallons. Under the State Rule Applicability - Individual Facilities section of the TSD (page 7 of 9) the specific equivalent conversion factor has been upgraded.

326 IAC 2-2 (Prevention of Significant Deterioration)

In order to avoid the requirements of 326 IAC 2-2 the new boiler house operations (three boilers and an emergency generator) had to take a limit on the amount of fuel combusted. Specifically, without the limitation the source would be above the significant threshold for NO_x, PM and PM10. Since natural gas will be the main fuel, and the boilers will consume the most fuel, this combination was set to be the base unit for the equivalent limitation. The limit was determined (see Appendix A, page 13 of 16 for detailed explanation) to be 4599 million equivalent cubic feet per twelve month period, rolled monthly. Based on the relative heat input values and the relative emission factors 0.480 million cubic feet of natural gas per thousand gallons fuel oil in the boiler was determined to be one conversion factor and ~~0.000457~~ 8.96 million cubic feet of natural gas per thousand gallons fuel oil in the generator was determined to be the other. Using these the source can report the actual use of each of the 3 options along with the “equivalent” natural gas use to compare to the limitation.

Response #3

The calculations were reviewed, and an error was found. Once the error was corrected, the numbers match those requested in the comment above. Additionally, references to the incorrect numbers in the TSD and permit pages were upgraded to match.

Comment #4

The sulfur limitation in section D.4 of the construction permit, condition D.4.10, is incorrect. According to 326 IAC 7-1.1-2, sulfur dioxide cannot be emitted to a level greater than 0.5 lb per mmBtu from a source burning distillate oil. Condition D.4.10 incorrectly set a limitation of 0.05% sulfur dioxide by weight. The condition should reflect the standard as written, which is 0.5 lb of sulfur dioxide per mmBtu heat input. Also a sulfur limit for the fuel combusted should be listed as 0.5% sulfur.

Response #4

The sulfur limitation was placed in the Modification at 0.05% by weight because it was specifically requested in the application. Since there was not a specific regulatory reason for this lower limitation, the sulfur limitation has been changed to reflect the current request. This caused several changes in the calculations and the TSD, as well as the following changes in the permit.

D.4.3 Sulfur Dioxide (SO₂) [326 IAC 7-1.1-2][40 CFR 60.42c(d)]

Pursuant to the requested limit in the permit application, the fuel oil utilized by these three (3) boilers (Boiler N1, Boiler N2 and Boiler N3) and the emergency generator (Emergency Generator 1) shall not contain more than ~~0.05%~~ **0.5%** sulfur. This limitation also meets the requirements of 326 IAC 7-1.1-2 and 40 CFR 60.42c(d).

D.4.10 Sulfur Dioxide Emissions and Sulfur Content [326 IAC 2-7-5(3)(A)] [326 IAC 2-7-6]

Pursuant to 326 IAC 7-1.1-2, the Permittee shall demonstrate that the sulfur dioxide emissions do not exceed ~~five hundredths of a percent (0.05%)~~ **one half of one percent (0.5%)** by weight. Compliance shall be determined utilizing one of the following options:

- (1) Providing vendor analysis of fuel oil delivered (as allowed under 40 CFR 60.42c(h)), if accompanied by a certification. If vendor analysis is utilized, the information provided must meet the requirements of 40 CFR 60.48c(f);
- (2) Analyzing the oil sample to determine the sulfur content and heating value of the oil via the procedures in 40 CFR 60, Appendix A, Method 19.
 - (A) Oil samples may be collected from the fuel tank immediately after the fuel tank is filled and before any oil is combusted; and
 - (B) If a partially empty fuel tank is refilled, a new sample and analysis would be required upon filling.

Additionally, on page 8 of 9 in the TSD the rule explanation for 326 IAC 7-1.1-2 needs upgraded to accommodate this request.

326 IAC 7-1.1-2 (Sulfur Dioxide Emission limitations)

Pursuant to 326 IAC 7-1.1-2 the fuel oil utilized by the boilers and the emergency generator can not exceed 0.5 pound per million BTU for distillate oil combustion. ~~The source specifically requested a limitation of 0.05% sulfur in the fuel oil utilized, so they easily meet this requirement as well as the NSPS requirement above.~~

On June, 17, 1999, Indiana State University submitted comments directly, on the proposed Significant Source Modification. The summary of the comments is as follows (~~strikeout~~ indicates language removed, **redline** indicates language added):

Comment #1

This letter is to address our concerns on the sulfur limit that you listed in the construction permit. You show a sulfur content limit of 0.05 weight percent sulfur. We are requesting that this limit be 0.5 weight percent sulfur as permitted by 40 CFR 60.42c(d). This will not result in a net increase of SO₂ from the facility.

Response #1

See the response to Comment #4 from the Stanley Consultants, Inc. section above.

Comment #2

We would also like to request a waiver from the State requirement that a visible inspection of the stack be taken whenever the facility is burning fuel oil in the boilers. The facility will have only one operator on duty and it will require the operator to leave the facility and his equipment unattended. The boilers will be equipped with continuous flue gas oxygen analyzers to measure oxygen content in the flue gas. Alarms from these analyzers will notify the operator of low oxygen in the flue gas, which would cause opacity problems. This will be a more reliable method of controlling opacity than a once a day inspection of the stack.

Response #2

The requirement of performing daily visible emission notations when a boiler is burning No. @ fuel oil is used to indicate that the source is in compliance with 326 IAC 5-1 and 326 IAC 6, and to indicate to the source whether or not a problem exists in the operation. The natural gas certification is used in lieu of daily visible emission notations, for when the boilers are burning natural gas. No changes have been made to the wording of Condition D.4.13 or the recordkeeping requirements related to this condition in D.4.14.

For fuel oil burned in the emergency generator, 8.96 million "equivalent" cubic feet = one thousand gallons fuel oil.

D.4.3 Sulfur Dioxide (SO₂) [326 IAC 7-1.1-2][40 CFR 60.42c(d)]

Pursuant to the requested limit in the permit application, the fuel oil utilized by these three (3) boilers (Boiler N1, Boiler N2 and Boiler N3) and the emergency generator (Emergency Generator 1) shall not contain more than 0.5% sulfur. This limitation also meets the requirements of 326 IAC 7-1.1-2 and 40 CFR 60.42c(d).

D.4.4 Particulate Matter (PM) [326 IAC 6-2-4]

Pursuant to 326 IAC 6-2-4, Boiler N1, Boiler N2, and Boiler N3 shall be limited to 0.256 pounds per MMBtu, which is equivalent to 67.77 pounds per hour and 296.8 tons per year. This limit was calculated using the equation: $Pt = 1.09/(Q^{0.26})$, with Pt = Pounds of particulate matter emitted per million BTU and Q = total source maximum operating capacity.

D.4.5 NSPS Opacity Limitations [40 CFR 60.43c(c)]

Pursuant to 40 CFR 60.43c(c) on and after the date on which the initial performance test is completed no gases shall be emitted into the atmosphere that exhibit greater than 20 percent opacity (6-minute average), except for one 6-minute period per hour of not more than 27 percent opacity.

D.4.6 Preventive Maintenance Plan [326 IAC 2-7-5(13)]

A Preventive Maintenance Plan, in accordance with Section B - Preventive Maintenance Plan, of this permit, is required for these facilities and control devices.

Compliance Determination Requirements

D.4.7 Initial Sulfur Dioxide Performance Test [40 CFR 60.44c(h)]

Pursuant to 40 CFR 60.44c(h) the initial performance test for the three boilers (Boiler N1, Boiler N2, and Boiler N3) shall consist of the fuel oil supplier certification from the initial fuel received. The certification shall contain, as a minimum, the information required by 40 CFR 60.48c(f).

D.4.8 Initial Opacity Performance Test [40 CFR 60.45c(a)]

Pursuant to 40 CFR 60.45c(a) within 60 days after achieving maximum production, but no later than 180 days after initial operation, Boiler N1, Boiler N2, and Boiler N3 shall each be tested for opacity emissions. These tests shall be conducted using Method 9 (40 CFR 60, Appendix A) for opacity emissions.

D.4.9 Testing Requirements [326 IAC 2-7-6(1),(6)]

The Permittee is not required to periodically test these facilities by this permit. However, IDEM and VCAPC may require compliance testing at any specific time when necessary to determine if the facility is in compliance. If testing is required by IDEM and VCAPC, compliance with the PM limit specified in Condition D.4.4 or the SO₂ limit specified in Condition D.4.3 shall be determined by a performance test conducted in accordance with Section C - Performance Testing.

D.4.10 Sulfur Dioxide Emissions and Sulfur Content [326 IAC 2-7-5(3)(A)] [326 IAC 2-7-6]

Pursuant to 326 IAC 7-1.1-2, the Permittee shall demonstrate that the sulfur dioxide emissions do not exceed one half of one percent (0.5%) by weight. Compliance shall be determined utilizing one of the following options:

- (1) Providing vendor analysis of fuel oil delivered (as allowed under 40 CFR 60.42c(h)), if accompanied by a certification. If vendor analysis is utilized, the information provided must meet the requirements of 40 CFR 60.48c(f);
- (2) Analyzing the oil sample to determine the sulfur content and heating value of the oil via the procedures in 40 CFR 60, Appendix A, Method 19.
 - (A) Oil samples may be collected from the fuel tank immediately after the fuel tank is filled and before any oil is combusted; and
 - (B) If a partially empty fuel tank is refilled, a new sample and analysis would be required upon filling.

D.4.11 Sulfur Dioxide Emissions [40 CFR 60.42c(i)]

Pursuant to 40 CFR 60.42c(i) the SO₂ emission limits or fuel oil sulfur limits apply at all times, including periods of startup, shutdown, and malfunction.

D.4.12 Opacity Standards [40 CFR 60.43c(d)]

Pursuant to 40 CFR 60.43c(d) the opacity emission limits apply at all times, except during periods of startup, shutdown, or malfunction.

Compliance Monitoring Requirements [326 IAC 2-7-6(1)] [326 IAC 2-7-5(1)]

D.4.13 Visible Emissions Notations

- (a) Daily visible emission notations of Boiler N1, Boiler N2, and Boiler N3 stack exhausts shall be performed during normal daylight operations when using No. 2 fuel oil. A trained employee shall record whether emissions are normal or abnormal.
- (b) For processes operated continuously, "normal" means those conditions prevailing, or expected to prevail, eighty percent (80%) of the time the process is in operation, not counting startup or shut down time.
- (c) In the case of batch or discontinuous operations, readings shall be taken during that part of the operation that would normally be expected to cause the greatest emissions.
- (d) A trained employee is an employee who has worked at the plant at least one (1) month and has been trained in the appearance and characteristics of normal visible emissions for that specific process.
- (e) The Compliance Response Plan for this unit shall contain troubleshooting contingency and response steps for when an abnormal emission is observed.

Record Keeping and Reporting Requirements [326 IAC 2-7-5(3)] [326 IAC 2-7-19]

D.4.14 Record Keeping Requirements

- (a) The Permittee shall record and maintain records of the amounts of each fuel combusted by emission unit during each day.
- (b) The Permittee shall keep readily accessible records showing the dimension of the storage vessel and an analysis showing the capacity of the storage vessel. This record shall be kept for the life of the source.
- (c) To document compliance with Conditions D.4.2, D.4.3, and D.4.4, the Permittee shall maintain records in accordance with (1) through (4) below. Records maintained for (1) through (4) shall be taken monthly and shall be complete and sufficient to establish compliance with the Fuel Use Limit under D.4.2 as well as the Particulate Matter (PM) and Sulfur Dioxide (SO₂) emission limits established in Condition D.4.3 and D.4.4.
 - (1) Calendar dates covered in the compliance determination period;
 - (2) Actual fuel usage since last compliance determination period for each type and combustion unit;
 - (3) Sulfur content;
 - (4) Calculated monthly "equivalent" natural gas use rates; and
 - (5) Calculated twelve month total "equivalent natural gas use rates.
- (d) To document compliance with Condition D.4.12, the Permittee shall maintain records of visible emission notations from stack 1, stack 2 and stack 3, whenever the respective boilers are burning No. 2 fuel oil.
- (e) All records shall be maintained in accordance with Section C - General Record Keeping Requirements, of this permit.

D.4.15 Reporting Requirements

- (a) The Permittee shall submit notification of the date of construction or reconstruction, anticipated startup, and actual startup, as provided by 40 CFR 60.7. The notification shall include all the information outlined in 40 CFR 48c(a)(1) through (4).
- (b) The Permittee shall submit the initial performance tests to the addresses listed in Section C - General Reporting Requirements.
- (c) The Permittee shall submit quarterly reports to the addresses listed in Section C - General Reporting Requirements. These quarterly reports shall include (as a minimum):
 - (a) Calendar dates covered in the reporting period;
 - (b) Each 30-day average SO₂ emission rate (pound per million BTU) or 30-day average sulfur content, calculated during the period, ending with the last 30-day period in the reporting quarter;
 - (c) Reasons for any noncompliance with the emission standards; and
 - (d) A description of the corrective actions taken.

Additionally, if fuel oil supplier certification is used to demonstrate compliance, the following must be included with the quarterly report:

- (a) The certifications from the supplier; and
 - (b) A statement from the Permittee that the records of fuel oil supplier certifications submitted represent all of the fuel combusted during the quarter.
- (d) A quarterly summary of the information to document compliance with Condition D.1.1 shall be submitted to the addresses listed in Section C - General Reporting Requirements, using the reporting forms located at the end of this permit, or their equivalent, within thirty (30) days after the end of the quarter being reported.

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR MANAGEMENT
COMPLIANCE DATA SECTION
and VIGO COUNTY AIR POLLUTION CONTROL**

**PART 70 OPERATING PERMIT
NATURAL GAS FIRED BOILER CERTIFICATION**

Source Name: Indiana State University
Source Address: 951 Sycamore Street, Terre Haute, Indiana 47809
Mailing Address: 951 Sycamore Street, Terre Haute, Indiana 47809
Part 70 Permit No.: 167-7546-00010

**This certification shall be included when submitting monitoring, testing reports/results
or other documents as required by this permit.**

Report period

Beginning: _____

Ending: _____

Boiler Affected

Alternate Fuel

Days burning alternate fuel

From

To

Boiler N1

No. 2 fuel oil

Boiler N2

No. 2 fuel oil

Boiler N3

No. 2 fuel oil

I certify that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete.

Signature: _____

Printed Name: _____

Title/Position: _____

Date: _____

**INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
OFFICE OF AIR MANAGEMENT, COMPLIANCE DATA SECTION
and VIGO COUNTY AIR POLLUTION CONTROL**

Part 70 Quarterly Report

Source Name: Indiana State University
Source Address: 951 Sycamore Street, Terre Haute, Indiana 47809
Mailing Address: 951 Sycamore Street, Terre Haute, Indiana 47809
Part 70 Permit No.: 167-7546-00010
Facility: Boiler #2
Parameter: Fuel usage by emission unit; equivalent million cubic feet of natural gas; twelve month total equivalent million cubic feet total
Limit: 4599 "equivalent" cubic feet of natural gas
YEAR: _____

Month	Million Cubic feet of natural gas used in boilers	Thousands of Gallons of fuel oil used in boilers	Thousands of gallons of fuel oil used in emergency generator	Equivalent million cubic feet for the month and for the last twelve months	
Month 1					
Month 2					
Month 3					

9 No deviation occurred in this quarter. Submitted by: _____

9 Deviation/s occurred in this quarter. Title / Position: _____
Deviation has been reported on: _____

Note: Please attach vender certification.

Signature: _____

Date: _____

Phone: _____

Appendix A: Emissions Calculations**Natural Gas Combustion Only****MM BTU/HR <100****Small Industrial Boiler****Three Boilers each rated at 88.24 MMBTU per hour****264.72 MMBTU per hour total heat input capacity****Company Name: Indiana State University****Address City IN Zip: 951 Sycamore Street, Terre Haute, Indiana 47809****CP: T167-10718****Pit ID: T167-00010****Reviewer: Rob Harmon****Date: Feburary 26, 1999**Heat Input Capacity
MMBtu/hrPotential Throughput
MMCF/yr

264.7

2318.9

Pollutant

Emission Factor in lb/MMCF	PM	PM10	SO2	NOx	VOC	CO
				50.0		
	7.6	7.6	0.6	*see below	5.5	84.0
Potential Emission in tons/yr	8.8	8.8	0.7	58.0	6.4	97.4

Methodology

All emission factors are based on normal firing.

MMBtu = 1,000,000 Btu

MMCF = 1,000,000 Cubic Feet of Gas

Emission Factors for NOx: Uncontrolled = 100, Low NOx Burner = 50, Low NOx Burners/Flue gas recirculation = 32

PM emission factors are condensable and filterable.

Potential Throughput (MMCF) = Heat Input Capacity (MMBtu/hr) x 8,760 hrs/yr x 1 MMCF/1,000 MMBtu

Emission Factors are from AP 42, Chapter 1.4, Tables 1.4-1, 1.4-2, 1.4-3, SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03
(SUPPLEMENT D 3/98)

Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

See page 2 for HAPs emissions calculations.

Appendix A: Emissions Calculations**Natural Gas Combustion Only****MM BTU/HR <100****Small Industrial Boiler****HAPs Emissions****Three Boilers each rated at 88.24 MMBTU per hour****264.72 MMBTU per hour total heat input capacity****Company Name: Indiana State University****Address City IN Zip: 951 Sycamore Street, Terre Haute, Indiana 47809****CP: T167-10718****Pit ID: T167-00010****Reviewer: Rob Harmon****Date: February 26, 1999****HAPs - Organics**

Emission Factor in lb/MMcf	Benzene 2.1E-03	Dichlorobenzene 1.2E-03	Formaldehyde 7.5E-02	Hexane 1.8E+00	Toluene 3.4E-03
Potential Emission in tons/yr	0.0	0.0	0.1	2.1	0.0

HAPs - Metals

Emission Factor in lb/MMcf	Lead 5.0E-04	Cadmium 1.1E-03	Chromium 1.4E-03	Manganese 3.8E-04	Nickel 2.1E-03
Potential Emission in tons/yr	0.0	0.0	0.0	0.0	0.0

Methodology is the same as page 1.

The five highest organic and metal HAPs emission factors are provided above.

Additional HAPs emission factors are available in AP-42, Chapter 1.4.

Appendix A: Emissions Calculations

Industrial Boilers

#1 and #2 Fuel Oil

Three Boilers each rated at 88.24 MMBTU per hour

264.72 MMBTU per hour total heat input capacity

Company Name: Indiana State University

Address, City IN Zip: 951 Sycamore Street, Terre Haute, Indiana 47809

CP: T167-10718

Plt ID: T167-00010

Reviewer: Rob Harmon

Date: Feburary 26, 1999

Heat Input Capacity

MMBtu/hr

Potential Throughput

kgals/year

S = Weight % Sulfur

0.5

264.72

16563.90857

Emission Factor in lb/kgal	Pollutant					
	PM	PM10	SO2	NOx	VOC	CO
	3.3	2.3	71 (142.0S)	24.0	0.20	5.0
Potential Emission in tons/yr	27.3	19.0	588.0	198.8	1.7	41.4

Methodology

1 gallon of No. 2 Fuel Oil has a heating value of 140,000 Btu

Potential Throughput (kgals/year) = Heat Input Capacity (MMBtu/hr) x 8,760 hrs/yr x 1kgal per 1000 gallon x 1 gal per 0.140 MM Btu

Emission Factors are from AP 42, Tables 1.3-1, 1.3-2, 1.3-3, and 1.3-6 (SCC 1-02-005-01/02/03) Supplement E 9/98

PM Emissions are Condensible and Filterable PM

Emission (tons/yr) = Throughput (kgals/ yr) x Emission Factor (lb/kgal)/2,000 lb/ton

Appendix A: Emissions Calculations**Industrial Boilers****#1 and #2 Fuel Oil****HAPs Emissions****Three Boilers each rated at 88.24 MMBTU per hour****264.72 MMBTU per hour total heat input capacity****Company Name: Indiana State University****Address, City IN Zip: 951 Sycamore Street, Terre Haute, Indiana 47809****CP: T167-10718****Plt ID: T167-00010****Reviewer: Rob Harmon****Date: February 26, 1999****HAPs - Metals**

Emission Factor in lb/MMBtu	Arsenic 4.0E-06	Beryllium 3.0E-06	Cadmium 3.0E-06	Chromium 3.0E-06	Lead 9.0E-06
Potential Emission in tons/yr	0.005	0.003	0.003	0.003	0.010

HAPs - Metals (continued)

Emission Factor in lb/MMBtu	Mercury 3.0E-06	Manganese 6.0E-06	Nickel 3.0E-06	Selenium 1.5E-05
Potential Emission in tons/yr	0.003	0.007	0.003	0.017

Methodology

No data was available in AP-42 for organic HAPs.

Potential Emissions (tons/year) = Throughput (MMBtu/hr)*Emission Factor (lb/MMBtu)*8,760 hrs/yr / 2,000 lb/ton

Appendix A: Emission Calculations
Internal Combustion Engines - Diesel Fuel
Reciprocating
Emergency Generator (1341 hp)

Page 5 of 16 TSD App A

Company Name: Indiana State University
Address City IN Zip: 951 Sycamore Street, Terre Haute, Indiana 47809
CP#: T167-10718
Plt ID: T167-00010
Reviewer: Rob Harmon
Date: Feburary 26, 1999

Emissions calculated based on output rating (hp)

Heat Input Capacity
Horsepower (hp)

Potential Throughput
hp-hr/yr

1408.0

704000.0

Emission Factor in lb/hp-hr	Pollutant					
	PM	PM10	SO2	NOx	VOC	CO
	0.0007	0.0007	0.0040 @ 0.5%S	0.0240	0.0007	0.0055
Potential Emission in tons/yr	0.2	0.2	1.4	8.4	0.2	1.9

Methodology

Potential Througput (hp-hr/yr) = hp * 500 hr/yr since the unit is an emergency unit only (plus a small amount of regular testing)

Emission Factors are from AP42, Table 3.4-1 and 3.4-2, and since the generator is above 600 hp

Emission (tons/yr) = [Heat input rate (MMBtu/hr) x Emission Factor (lb/MMBtu)] * 8760 hr/yr / (2,000 lb/ton)

Emission (tons/yr) = [Potential Throughput (hp-hr/yr) x Emission Factor (lb/hp-hr)] / (2,000 lb/ton)

Since the PM and VOC emissions are so low, additional HAP calculations were not performed

Appendix A: Emissions Calculations
Potential Emission Summary

Page 6 of 16 TSD App A

Company Name: Indiana State University
Address City IN Zip: 951 Sycamore Street, Terre Haute, Indiana 47809
CP: T167-10718
Plt ID: T167-00010
Reviewer: Rob Harmon
Date: Feburary 26, 1999

	Pollutant (tons per year)					
	PM	PM10	SO2	NOx	VOC	CO
Boiler Potential Emissions (NG)	8.81	8.81	0.70	57.97	6.38	97.40
Boiler Potential Emissions (FO)	27.33	19.05	588.02	198.77	1.66	41.41
Boiler Potential Emissions (Worst Case)	27.33	19.05	588.02	198.77	6.38	97.40
Generator Potential Emissions	0.25	0.25	1.42	8.45	0.25	1.94
Total Potential Emissions	27.58	19.29	589.44	207.21	6.63	99.33
PSD Significant Levels	25.00	15.00	40.00	40.00	40.00	100.00

So without restrictions or other net emission changes, this proposal would be a major modification with regard to PSD.

However, ISU will be removing several pieces of equipment at the same time, so the creditable emissions decreases are presented on the following pages.

Appendix A: Emissions Calculations
Creditable Emission Reduction Calculations

Company Name: Indiana State University
Address City IN Zip: 951 Sycamore Street, Terre Haute, Indiana 47809
CP: T167-10718
Pit ID: T167-00010
Reviewer: Rob Harmon
Date: Feburary 26, 1999

Month	Boiler #2	Boiler #3	Boiler #4		Boiler #5		Coal		
	Ton Coal	Ton Coal	MMCF NG	KGal Oil	MMCF NG	KGal Oil	Ton Coal	BTU/lb	%S
Feb-97	1300	1626	0.000	0.000	0.000	0.000	0	11956	2.17
Mar-97	1139	1420	0.000	0.000	0.000	0.000	0	12033	2.38
Apr-97	656	1382	0.000	0.000	0.000	0.000	0	11873	2.63
May-97	0	2055	0.000	0.000	0.000	0.000	0	12154	2.05
Jun-97	0	1391	0.009	0.000	0.000	0.000	0	12183	2.42
Jul-97	0	9	15.507	0.000	0.000	0.000	0	12183	2.42
Aug-97	0	0	15.979	0.000	0.000	0.000	0	NA	NA
Sep-97	0	0	18.321	0.000	0.000	0.000	0	NA	NA
Oct-97	425	1227	2.402	0.000	0.000	0.000	0	11554	1.88
Nov-97	1091	1563	0.026	0.000	0.000	0.000	0	11865	1.84
Dec-97	1212	1626	0.000	0.000	0.002	0.000	0	12003	1.95
Jan-98	1273	1674	0.000	0.000	0.000	0.000	0	11854	1.78
Feb-98	1037	1391	0.060	0.000	0.000	0.000	0	11719	1.74
Mar-98	625	1628	0.923	25.564	0.000	0.000	0	12219	1.69
Apr-98	167	1881	0.000	10.239	0.000	0.000	0	12132	1.88
May-98	0	1312	0.000	0.000	0.000	0.000	0	11830	1.9
Jun-98	0	11	17.368	0.000	0.000	0.000	0	11183	1.43
Jul-98	0	0	15.635	0.000	0.000	0.000	0	NA	NA
Aug-98	0	0	15.583	0.000	0.000	0.000	0	NA	NA
Sep-98	0	0	18.222	0.000	0.000	0.000	0	NA	NA
Oct-98	0	1653	0.289	0.000	0.000	0.000	0	11881	2.11
Nov-98	875	1383	0.000	0.000	0.000	0.000	0	11822	1.89
Dec-98	975	1627	0.000	11.211	0.000	0.000	0	12027	1.72
Jan-99	1266	1849	0.000	6.064	0.000	0.000	0	12172	2.06
2-year tot	12041	26708	120.324	53.078	0.002	0.000	0	0	0
avg per year	6020	13354	60.162	26.539	0.001	0.000	0	0	0

Appendix A: Emissions Calculations
Creditable Emission Reduction Calculations
Coal Combustion

Company Name: Indiana State University
Address City IN Zip: 951 Sycamore Street, Terre Haute, Indiana 47809
CP: T167-10718
Pit ID: T167-00010
Reviewer: Rob Harmon
Date: February 26, 1999

The % Sulfur for the coal emission calculations should be determined using a weighted average. This will make the months with a smaller coal consumption have a lesser impact on the average than the high use months and should be a much better indication of the actual average composition utilized. This weighted average is determined by multiplying the coal used in a given month by the associated % sulfur. The values from this calculation are added together and the sum is divided by the total coal used for the entire period.

1.99 Weighted average % sulfur for the entire 2 year period.
38749 Total coal used during the 2 year period.
19374 Average coal used per year.

Since the emission factors are the same for coal combustion in Boilers #2 and #3, the calculation was combined.

Actual Throughput Weight %
tons/year Sulfur in Fuel
19,374 S = 1.99 %

	Pollutant					
Emission Factor in lb/ton	PM 16.0	PM10 6.04	SO2 75.7 (38S)	NOx 7.5	VOC 0.05	CO 6.00
Actual Emission in tons/yr	155.4	58.5	733.5	72.7	0.5	58.1
With control 99.00% efficiency	1.6	0.6	733.5	72.7	0.5	58.1

Methodology

PM emission factors are filterable PM and condensable PM combined.

Emission Factors from AP-42, Chapter 1.1 for industrial overfeed stoker SCC 1-02-002-05/25 (Supplement E, 9/98)

Additional emission factors for commercial/institutional and electric generation boilers are available in AP-42, Chapter 1.1.

Several HAPs emission factors are also available in AP-42, Chapter 1.1, depending on the type of boiler.

Emission (tons/yr) = Throughput tons per year x Emission Factor (lb/ton) / 2,000 lb/ton

Appendix A: Emissions Calculations
Creditable Emission Reduction Calculations
Fuel Oil Combustion

Company Name: Indiana State University
Address City IN Zip: 951 Sycamore Street, Terre Haute, Indiana 47809
CP: T167-10718
Pft ID: T167-00010
Reviewer: Rob Harmon
Date: Feburary 26, 1999

Actual Throughput
kgals/year

S = Weight % Sulfur

0.05

26.53905

Emission Factor in lb/kgal	Pollutant					
	PM 3.3	PM10 2.3	SO2 7.1 (142.0S)	NOx 24.0	VOC 0.20	CO 5.0
Actual Emission in tons/yr	0.04	0.03	0.09	0.32	0.00	0.07

Methodology

Emission Factors are from AP 42, Tables 1.3-1, 1.3-2, 1.3-3, and 1.3-6 (SCC 1-02-005-01/02/03) Supplement E 9/98

PM Emissions are Condensable and Filterable PM

Emission (tons/yr) = Throughput (kgals/ yr) x Emission Factor (lb/kgal)/2,000 lb/ton

**Appendix A: Emissions Calculations
Creditable Emission Reduction Calculations
Natural Gas Combustion**

Page 10 of 16 TSD App A

**Company Name: Indiana State University
Address City IN Zip: 951 Sycamore Street, Terre Haute, Indiana 47809
CP: T167-10718
Plt ID: T167-00010
Reviewer: Rob Harmon
Date: Feburary 26, 1999**

Since almost all the natural gas was combusted in a boiler rated at 93.75 MMBTU per hour, all the natural gas emissions were caluclated using these emission factors.

Actual Throughput
MMCF/yr

60.2

	Pollutant					
	PM	PM10	SO2	NOx	VOC	CO
Emission Factor in lb/MMCF	7.6	7.6	0.6	100.0	5.5	84.0
				*see below		
Potential Emission in tons/yr	0.2	0.2	0.0	3.0	0.2	2.5

Methodology

All emission factors are based on normal firing.

MMBtu = 1,000,000 Btu

MMCF = 1,000,000 Cubic Feet of Gas

Emission Factors for NOx: Uncontrolled = 100, Low NOx Burner = 50, Low NOx Burners/Flue gas recirculation = 32

PM emission factors are condensable and filterable.

Emission Factors are from AP 42, Chapter 1.4, Tables 1.4-1, 1.4-2, 1.4-3, SCC #1-02-006-02, 1-01-006-02, 1-03-006-02, and 1-03-006-03 (SUPPLEMENT D 3/98)

Emission (tons/yr) = Throughput (MMCF/yr) x Emission Factor (lb/MMCF)/2,000 lb/ton

Appendix A: Emissions Calculations
Creditable Emission Reduction Calculations
Total Emission Reductions

Company Name: Indiana State University
Address City IN Zip: 951 Sycamore Street, Terre Haute, Indiana 47809
CP: T167-10718
Plt ID: T167-00010
Reviewer: Rob Harmon
Date: Feburary 26, 1999

	Pollutant (tons per year)					
	PM	PM10	SO2	NOx	VOC	CO
Coal Combustion	1.55	0.59	733.48	72.65	0.48	58.12
Fuel Oil Combustion	0.04	0.03	0.09	0.32	0.00	0.07
Natural Gas Combustion	0.23	0.23	0.02	3.01	0.17	2.53
Total Emission Reduction	1.83	0.84	733.59	75.98	0.65	60.72

Appendix A: Emissions Calculations
Net Emission Change

Page 12 of 16 TSD App A

Company Name: Indiana State University
Address City IN Zip: 951 Sycamore Street, Terre Haute, Indiana 47809
CP: T167-10718
Plt ID: T167-00010
Reviewer: Rob Harmon
Date: Feburary 26, 1999

	Pollutant (tons per year)					
	PM	PM10	SO2	NOx	VOC	CO
Potential Emissions from the Project	27.58	19.29	589.44	207.21	6.63	99.33
Subtract Creditable Reductions	1.83	0.84	733.59	75.98	0.65	60.72
Total Net Emissions	25.75	18.45	-144.15	131.23	5.97	38.62
PSD Significant Levels	25.00	15.00	40.00	40.00	40.00	100.00

Therefore, without limitations, the project would still be PSD Significant without the use of synthetic minor limitations. It is triggered by the NOx, PM and PM10 emissions, but the NOx limitations should be sufficient to reduce all three beneath the significant level. This assumption will be verified with calculations after the appropriate limitations are determined.

Appendix A: Emissions Calculations
Emission Limitation Calculations

Page 13 of 16 TSD App A

Company Name: Indiana State University
Address City IN Zip: 951 Sycamore Street, Terre Haute, Indiana 47809
CP: T167-10718
Plt ID: T167-00010
Reviewer: Rob Harmon
Date: Feburary 26, 1999

Need to set the Net NOx emissions to 39 tons per year. Then the Project Limit can be back calculated. Indiana State University has requested this limitation to be as flexible as possible, so the limitation will be set to this emission level and a method to determine the equivalent amount of each fuel (and method) combusted will be calculated and incorporated into the permit. This equivalent method will also be tested to ensure the other pollutants are also limited below the PSD Significant Levels.

39.00 Tons per year Net limit (NOx)
75.98 Tons per year Creditable Reductions (NOx)
114.98 Tons per year Project Limit (NOx) [Calculated as Net Limit + Creditable Reductions]

Since Indiana State University intends to use natural gas as the primary fuel, and since the boilers will be the primary emission cause, natural gas combusted in the boilers will be the base unit for the equivalence calculations.

114.98 Tons per year Project Limit (NOx)
50 Pounds of NOx emitted per million cubic feet natural gas burned
2000 pounds per ton
4599 Million Equivalent Cubic Feet of Natural gas to meet the emission limit per year

Note, this is above the potential natural gas consumption, so burning natural gas alone can not exceed the emission limit.

Appendix A: Emissions Calculations
Emission Limitation Calculations

Page 14 of 16 TSD App A

Company Name: Indiana State University
Address City IN Zip: 951 Sycamore Street, Terre Haute, Indiana 47809
CP: T167-10718
Plt ID: T167-00010
Reviewer: Rob Harmon
Date: Feburary 26, 1999

Equivalent Fuel Oil Use (boilers)

50 Pounds of NOx emitted per million cubic feet natural gas burned

24 Pounds of NOx emitted per thousand gallons fuel oil burned

0.480 Equivalent million cubic feet of natural gas per thousand gallons oil in boiler [FO Emission Factor / NG Emission Factor]

9581.72 Thousand gallons of fuel oil in the boilers to meet the emission limit per year

Equivalent Fuel Oil Use (emergency generator)

50 Pounds of NOx emitted per million cubic feet natural gas burned

3.2 Pounds of NOx emitted per million BTU fuel input [AP-42, Table 3.4-1]

0.14 million BTU per gallon fuel oil

448 Pounds of NOx emitted per thousand gallons fuel oil burned in the generator

8.96 Equivalent million cubic feet of natural gas per thousand gallons oil in generator [FO Emission Factor / NG Emission Factor]

513.3 Thousand gallons of fuel oil in the generator to meet the emission limit per year

Since only the fuel oil in the boiler equivalent limit is below the potential emissions, it is the true limiting factor and calculating compliance with only fuel oil in the boilers would demonstrate the worst case emissions after the limitation.

Appendix A: Emissions Calculations
Emission Limitation Calculations

Page 15 of 16 TSD App A

Company Name: Indiana State University
Address City IN Zip: 951 Sycamore Street, Terre Haute, Indiana 47809
CP: T167-10718
Plt ID: T167-00010
Reviewer: Rob Harmon
Date: Feburary 26, 1999

Potential Throughput S = Weight % Sulfur
 kgals/year 0.5

9581.720456

Emission Factor in lb/kgal	Pollutant					
	PM 3.3	PM10 2.3	SO2 71 (142.0S)	NOx 24.0	VOC 0.20	CO 5.0
Potential Emission in tons/yr	15.8	11.0	340.2	115.0	1.0	24.0

Methodology

1 gallon of No. 2 Fuel Oil has a heating value of 140,000 Btu

Potential Throughput (kgals/year) = Heat Input Capacity (MMBtu/hr) x 8,760 hrs/yr x 1kgal per 1000 gallon x 1 gal per 0.140 MM Btu

The Sulfur was limited to 0.05% due to a request by Indiana State University

Emission Factors are from AP 42, Tables 1.3-1, 1.3-2, 1.3-3, 1.3-6 (SCC 1-02-005-01/02/03) Supplement E 9/98

PM Emissions are Condensable and Filterable PM

Emission (tons/yr) = Throughput (kgals/ yr) x Emission Factor (lb/kgal)/2,000 lb/ton

Appendix A: Emissions Calculations
Net Emission Change after Limitation

Page 16 of 16 TSD App A

Company Name: Indiana State University
Address City IN Zip: 951 Sycamore Street, Terre Haute, Indiana 47809
CP: T167-10718
Plt ID: T167-00010
Reviewer: Rob Harmon
Date: Feburary 26, 1999

	Pollutant (tons per year)					
	PM	PM10	SO2	NOx	VOC	CO
Potential Emissions from the Project	15.81	11.02	340.15	114.98	0.96	23.95
Subtract Creditable Reductions	1.83	0.84	733.59	75.98	0.65	60.72
Total Net Emissions	13.98	10.17	-393.44	39.00	0.31	-36.76
PSD Significant Levels	25.00	15.00	40.00	40.00	40.00	100.00

Therefore, the limitation works to keep the Project below the PSD significant level for all pollutants.